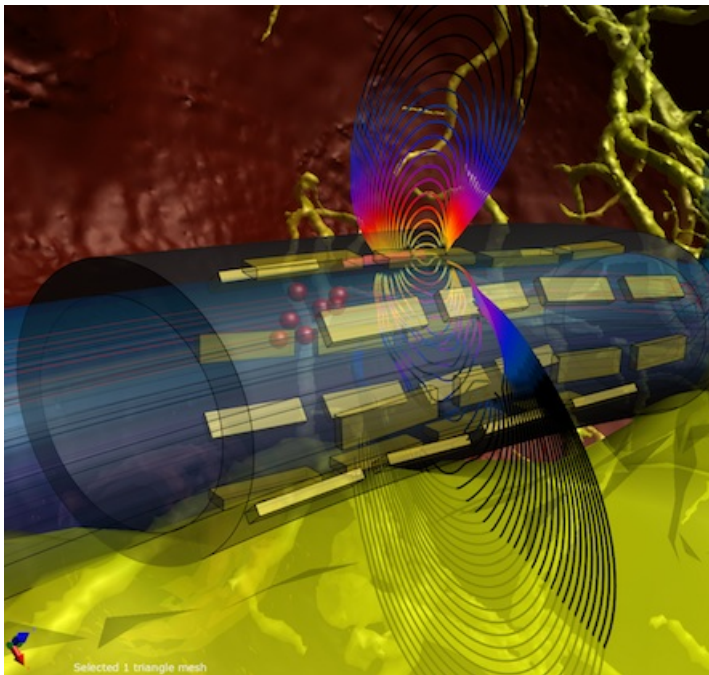


## Neuronal Tissue Models

The Neuronal Tissue Models (T-NEURO) enable the dynamic modeling of EM-induced neuronal activation, inhibition, and synchronization using either complex, multi-compartmental representations of axons, neurons, and neuronal networks with varying channel dynamics, or generic models. [Sim4Life](#) uses the [NEURON](#) solver developed at the Yale University which is ideal for studying interaction mechanisms, evaluating and optimizing neurostimulating devices, and assessing safety issues. T-NEURO now also permits to accurately and efficiently deal with neural sensing – the simulation of measurable electric signals resulting from neural activity.



Stimulation of the vagus nerve with a multi-element cuff electrode array.

Embedded geometrical and dynamical representation of neurons (soma, axon, and dendritic tree) generate physiologically functionalized anatomical models.

The SENN model (safety standards) and more complex models can be applied inside whole-body models. The graphics user interface (GUI) facilitates the integration of other neuronal models from commonly used databases or independently derived models.

T-NEURO has been validated against published data and *ex vivo* and *in vivo* measurements, and is continually advanced and validated.

### Application Areas

- MRgFUS Neurosurgery Applications: Tumor Ablation, Neuropathic Pain Treatment, Movement Disorders
- FUS-Based Neural Stimulation
- EM Neuro-Stimulation
- **Neural sensing:** Compound action potential (CAP), electroencephalogram (EEG), and electrocorticogram (ECoG) recordings
- Neuro-Prosthetics (retina, cochlea, vestibular, motor)
- High LF-EM Field Safety Assessment (e.g., MR Gradient Coils)
- Pacemaker
- Temperature Impact on Neuronal Dynamics
- Neuro-Motoric Incapacitation

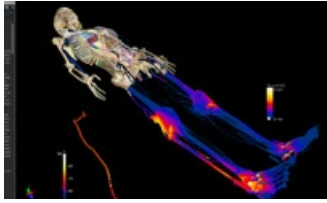
### Key Features

- Dynamic modeling of EM-induced neuronal activation inhibition & synchronization
- Unidirectional coupling with the EM-QS and Thermal solver
- Accurately and efficiently dealing with neural sensing
- Powerful **Hessian Calculator** for the
- Interface allows integration of other neuronal models from commonly used databases
- User-friendly import & visualization of nerve geometries from commonly used databases
- Determining thresholds through titration procedure
- Detection of neuronal spikes
- Novel spatially varying temperature dependence impact on the neuronal dynamics
- Capturing & plotting membrane dynamics over time
- Easily define pulse sources that correspond to gradient switching fields
- Applicable to

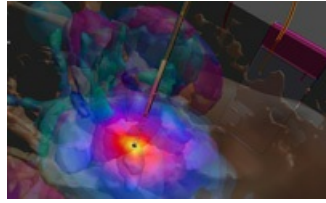
investigation of electrical neuro-stimulation within the complexity of the human anatomy

and their occurrence times  
▪ SENN model can be applied inside whole body models

heterogeneous, anisotropic dielectric environment model, including the most complex anatomical representations



*Neuronal response modeling in MRI gradient switching fields with RF induced local temperature increases considered.*



*Improved DBS treatment analysis facilitated by the head model with incorporation of the Morel stereotactic atlas of the thalamus.*



*Propagation of the transmembrane voltage in a rat hippocampus neuron with a detailed dendritic tree.*

➤ [Request your free 30-day trial](#)